A review of using conductive composite materials in solving lightening strike and ice accumulation problems in aviation

ABSTRACT

There are many problems facing aircraft in the air during flight, such as lightning strikes and ice accumulation on aircraft surfaces. These problems usually reduce aircraft efficiency and lead to serious accidents and fatalities. However, the current protection systems used to solve these problems of aircraft represent excessive energy usage, a hazard to the environment, and they are generally bulky, heavy and costly. Therefore, there are new conductive composites containing an embedded layer of conductive fibers such as graphene and carbon nanotube designed to carry lightning currents, in addition to that, there is a new deicing heater element made of graphene nanoribbons films to be used in ice protection systems. This paper presents a review of some problems facing aircraft in the air, such as lightning and ice accumulation on the surfaces of the aircraft and the significant efforts that have been exerted to address and solve these issues. Also, this paper reviews the contribution of composite materials in reducing the weight of the aircraft and fuel consumption as well as increasing the efficiency of aircraft. This paper also will review the conductive composite materials and its application for aviation, in addition to their contribution to solving the most important problems in aviation.

Keyword: Composite materials; Electrical resistivity; Composites; Electronic properties; Nanocomposites